

CLAIMS

We claim:

1. An interface module for communicating messages with a remote location and to provide access to an at least one intelligent electronic device (IED) operably connected to a communication network, the interface module comprising:
 - a central processing unit;
 - an operating system operating the central processing unit;
 - a network interface for communicating with the communication network;
 - a protocol stack for managing the communication on the network;
 - a protocol task for processing the communication according to the protocol stack;
 - a set of application tasks communicating with the protocol task for responding to an incoming message from the communication network and initiating an outgoing message to the communication network; and,
 - an interconnection bus with an interface driver for communicating with the at least one IED.
2. The interface module of claim 1 wherein the communication network is a worldwide Internet network using the Internet Protocol (IP).
3. The interface module of claim 2 operating as a Web site on the Internet, the interface module having a global IP address.
4. The interface module of claim 1 wherein the network interface is operably connected to a driver.
5. The interface module of claim 4 wherein the network interface is operably connected to an Ethernet driver.
6. The interface module of claim 4 wherein the network interface is operably connected to a SLIP/PPP driver.
7. The interface module of claim 1 wherein the protocol stack is a Transmission Control Protocol stack.
8. The interface module of claim 1 wherein the set of application tasks includes a control task for processing the messages between a remote location and the at least one IED using an industrial communication standard Modbus over TCP/IP.
9. The interface module of claim 8 wherein the control task accepts a connection; parses a Modbus message; and, calls the operating system to process the Modbus message.

10. The interface module of claim 9 wherein the control task comprises means for processing the Modbus message received from the remote location over the communication network; accessing data on the at least one IED; and, sending back a response.

11. The interface of claim 10 wherein the control task further includes means for initiating the message allowing the at least one IED to communicate with the remote module.

12. The interface of claim 1 wherein the set of application tasks comprises a HTTP server task for processing the Hypertext Transport Protocol (HTTP) to provide a standard Web access to a remote Web browser.

13. The interface module of claim 12 wherein the HTTP server task accepts a connection; parses an HTTP message; and, calls the operating system to process the HTTP message.

14. The interface module of claim 13 wherein the HTTP message allows a user at a remote location to view data within the at least one IED from the browser operably connected to the communication network.

15. The interface module of claim 13 wherein the HTTP message allows a user at a remote location to write data within the at least one IED from the browser operably connected to the communication network.

16. The interface module of claim 2 wherein the set of application tasks comprises a FTP server task for processing a File Transfer Protocol (FTP).

17. The interface module of claim 16 wherein the FTP server task accepts a connection; parses an FTP message; and, calls the operating system to process the FTP message.

18. The interface module of claim 17 wherein the FTP message allows a user at a remote location to download a file for updating the operating software within the at least one IED through the Internet.

19. The interface module of claim 17 wherein the FTP message allows a user at a remote location to upload a file for obtaining data records from the at least one IED through the Internet.

20. The interface module of claim 1 wherein the data transfer enabling means comprises a dual TCP/IP stack.

21. The interface module of claim 20 wherein the dual TCP/IP stack comprises a first stack capable of handling a broad range of TCP/IP messages and a second stack capable of handling a less broad range of TCP/IP messages more quickly than the first stack is capable of handling the broad range of TCP/IP messages.

22. A control system for allowing a user access at a remote site through a communication network, to information and data contained in an electrical network control system having an at least one intelligent electronic device (IED), the control system comprising:

means for coupling the remote site to the communication network, the coupling means including a Web browser for interacting with the communication network;

a Web site associated with the electrical network control system and accessible through the communication network;

means for linking the electrical network control system to the Web site, the linking means including an interface module for coupling the at least one IED to the communication network;

means for coupling the interface module to the at least one IED and transferring messages between the interface module and the at least one IED;

means for enabling the message transfer between the remote location and the electrical network control system; and,

means for processing a message received from the remote location over the communication network, the means for processing the message comprising means for receiving a message; means for accessing the at least one IED for the message; and, means for sending a response to the remote location through the communication network.

23. The control system of claim 22 wherein the communication network is a worldwide Internet network using an Internet Protocol (IP).

24. The control system of claim 22 wherein the interface module operates as a Web site on the Internet, the interface module having a global IP address.

25. The control system of claim 24 wherein the interface module comprises a network driver for receiving the message from the Web browser on the Internet and for sending a response back to the Web browser.

26. The control system of claim 25 wherein the message transfer enabling means comprises a protocol task using a Transmission Control Protocol (TCP).

27. The control system of claim 26 wherein the protocol task implements a dual TCP stack.

28. The control system of claim 27 wherein the dual TCP stack comprises one stack capable of handling TCP/IP messages with a higher priority than the other stack.

29. The control system of claim 28 wherein the message processing means comprises a control task for processing a message exchange over the communication network between a remote application and the at least one IED using the industrial communication standard Modbus over TCP/IP.

30. The control system of claim 29 wherein the control task accepts a connection; parses a Modbus message; and, calls the operating system to process the Modbus message.

31. The control system of claim 30 wherein the control task includes means for processing the message received from the remote location over the communication network; accessing data on the at least one IED; and, sending back a response.

32. The control system of claim 31 wherein the control task further includes means for initiating the message allowing the IED to communicate with the remote location over the communication network.

33. The control system of claim 28 wherein the data message processing means includes a FTP server task for processing a File Transfer Protocol (FTP).

34. The control system of claim 33 wherein the FTP server task accepts a connection; parses an FTP message; and, calls the operating system to process the FTP message.

35. The control system of claim 34 wherein the FTP message allows a user at the remote location to download a file through the Internet for updating the operating software within the at least one IED associated with the electrical network control system.

36. The control system of claim 35 wherein the FTP message allows a user at the remote location to upload through the Internet a file for obtaining data records from the at least one IED associated with the electrical network control system.

37. The control system of claim 28 wherein the data message processing means includes a HTTP server task for processing a Hypertext Transport Protocol (HTTP) to provide access to the remote Web browser.

38. The control system of claim 37 wherein the HTTP task accepts a connection; parses an HTTP message; and, calls the operating system to process the HTTP message.
39. The control system of claim 38 wherein the HTTP message allows a user at the remote location to view the electrical network control system from a browser connected to the Internet.
40. The control system of claim 39 wherein the HTTP message allows a user at the remote location to write to the electrical network control system from a browser connected to the Internet.
41. The control system of claim 38 wherein the HTTP message allows a user at the remote location to view IED data from a browser connected to the Internet.
42. The control system of claim 39 wherein the HTTP message allows a user at the remote location to write IED data from a browser connected to the Internet.
43. The control system of claim 38 wherein a Java message allows a user at the remote location to view IED data from a browser connected to the Internet.
44. The control system of claim 39 wherein a Java message allows a user at the remote location to write IED data from a browser connected to the Internet.
45. The control system of claim 38 wherein an ActiveX message allows a user at the remote location to view IED data from a browser connected to the Internet.
46. The control system of claim 39 wherein an ActiveX message allows a user at the remote location to write IED data from a browser connected to the Internet.
47. A method of communicating with an intelligent electronic device operably connected to a communication network, the method comprising the steps of:
utilizing a web browser to contact the intelligent electronic device; and,
obtaining information from the intelligent electronic device.
48. The method of claim 47 further comprising the step of sending information to the intelligent electronic device from the web browser.